AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. [Original] A method for producing a three-dimensional model of a semiconductor chip from coarsely aligned mosaic images of respective layers of the semiconductor chip, the method comprising:

applying a line detection algorithm to each of the mosaic images to produce a set of line segments identified by x and y coordinates of ends of each line segment with respect to a frame defined by the mosaic image;

establishing virtual reference marks using end points of different mosaic images that are vertically aligned to within an uncertainty of the coarse alignment of the mosaic images;

using the virtual reference marks to adjust x and y coordinates of each of the mosaic images to derive a three dimensional coordinate space; and

processing the end points within the three dimensional coordinate space to define vias, lines and branch lines of the semiconductor chip, interconnected to define the three-dimensional model.

2. [Original] The method as claimed in claim 1 wherein applying the line detection algorithm comprises:

applying an edge detector to obtain an edge bitmap defining edge objects;

selecting pixel regions of edge objects that are likely to constitute segments of metal lines, given parameters of the semiconductor chip; and

applying a line tracing algorithm to each edge object to identify and store coordinates of corresponding line segments.

3. [Original] The method as claimed in claim 2 wherein applying the line tracing algorithm further comprises storing line segment coordinates in a hierarchical format with branch line segments nested with respect to previously identified line segments.

4. [Original] The method as claimed in claim 2 wherein applying an edge detector further comprises applying an algorithm that computes a difference between pixel values of neighboring pixels on opposite sides of a subject pixel to determine that the subject pixel is an edge transition pixel if the difference is above a predefined threshold.

5. [Original] The method as claimed in claim 4 wherein applying an edge detector further comprises applying an algorithm derived from at least one of Sobel, Prewitt, Roberts, and Hough transforms.

6. [Original] The method as claimed in claim 2 wherein applying the line tracing algorithm further comprises:

applying a line thinning procedure to pixels of the mosaic image bounded by the pixel regions of selected edge objects to produce a thinned line; and

defining the line segments by coordinate positions of the pixels at the ends of line segments, and storing the end point coordinates in a database.

7. [Original] The method as claimed in claim 6 wherein applying the line thinning procedure comprises iteratively setting pixel values of boundary pixels to a background pixel value, until the pixels that remain are bounded by background pixel values on two sides.

8. [Original] The method as claimed in claim 6 wherein applying the line thinning procedure comprises applying an algorithm derived from at least one of a Zhang Suen skeletonizing algorithm, and a Stentiford skeletonizing algorithm.

9. [Original] The method as claimed in claim 6 wherein applying the edge detection algorithm further comprises computing for each line segment a measure of uncertainty that the line segment constitutes a part of a metal line, using properties of the edge object, and properties of the thinned line given the die properties.

10. [Original] The method as claimed in claim 9 further comprising requesting an operator to examine the line segments with uncertainty measures above a predefined threshold.

11. [Original] The method as claimed in claim 1 wherein establishing virtual reference marks further comprises for each line segment end point on each mosaic image:

counting a number of other mosaic images that have coincident end points in a common projective x-y plane within an uncertainty of the coarse layer alignment;

identifying end points with a high coincidence in the x-y plane; and

selecting from the identified end points the virtual reference marks.

12. [Original] The method as claimed in claim 11 further comprising identifying a mosaic image having end points associated with a highest percentage of the virtual reference marks, and aligning each mosaic image to the identified mosaic image by adjusting x and y coordinates of each of the other mosaic images.

13. [Original] The method as claimed in claim 1 wherein processing the end points further comprises using predefined rules regarding configuration of the line segments to define lines and branch lines of the semiconductor chip.

14. [Original] The method as claimed in claim 1 further comprising displaying the 3-dimensional model to an operator, as a set of lines of predefined thickness.

15. [Original] The method as claimed in claim 14 wherein displaying further comprises permitting the user to view any one of the mosaic images alone, the mosaic images with the 3-D model overlayed, and 3-D model alone.

16. [Original] The method as claimed in claim 14 wherein displaying the 3-D model to the operator comprises permitting the operator to select any line, to create an annotation for a selected line; and to edit the connectivity of the line segments, and placements of vias.

17. [Original] The method as claimed in claim 14 wherein displaying the 3-D model to the operator comprises permitting the operator to select a geometric area, and displaying a part of the 3-D model in the geometric area.

18. [Cancelled]

19. [Cancelled]

20. [Cancelled]